

**Invoice****Moffatt & Nichol****P.O. Box 22648****Long Beach, CA 90801-5648****Phone: (562) 590-6500**

Robert Law  
De Maximis Inc.  
186 Center Street, Suite 290  
Clinton, NJ 08809

26-Apr-16  
Invoice No:

717664

Project 6664-04 Lower Passaic River/Newark Bay Modeling

**Professional Services from February 28, 2016 to March 26, 2016****LPR/NB Modeling Program NB Model of the LPR/NB**

Task 01 Coordination and Meetings

Coordination and Meetings

**Professional Personnel**

	<b>Hours</b>	<b>Rate</b>	<b>Amount</b>	
Senior Engineer/Scientist				
Canizares, Rafael	25.00	209.00	5,225.00	
Totals	25.00		5,225.00	
<b>Total Labor</b>				<b>5,225.00</b>
		<b>Total this Task</b>		<b>\$5,225.00</b>

Task 03 System Understanding

System Understanding

**Professional Personnel**

	<b>Hours</b>	<b>Rate</b>	<b>Amount</b>	
Engineer/Scientist II				
Mathew, Rooni	24.00	172.00	4,128.00	
Staff Engineer/Scientist				
Manian, Dinesh	16.00	119.00	1,904.00	
Totals	40.00		6,032.00	
<b>Total Labor</b>				<b>6,032.00</b>
		<b>Total this Task</b>		<b>\$6,032.00</b>

Task 06 NB HD and ST Model Calibration Report

NB HD and ST Model Calibration Report

**Professional Personnel**

	<b>Hours</b>	<b>Rate</b>	<b>Amount</b>	
Senior Engineer/Scientist				
Canizares, Rafael	4.00	209.00	836.00	
Engineer/Scientist II				
Mathew, Rooni	106.00	172.00	18,232.00	
Staff Engineer/Scientist				
Manian, Dinesh	110.00	119.00	13,090.00	
Totals	220.00		32,158.00	
<b>Total Labor</b>				<b>32,158.00</b>
		<b>Total this Task</b>		<b>\$32,158.00</b>

Total this Phase \$43,415.00

ACH Payment Remittance Information  
Bank Account Name: Moffatt & Nichol  
Bank Number: 4159349729  
Routing: 121000248

TOTAL THIS INVOICE \$43,415.00

Project 6664-04

Lower Passaic River/Newark Bay Modeling

Invoice 717664

# Billing Backup

Tuesday, April 26, 2016

Moffatt &amp; Nichol

Invoice 717664 Dated 4/26/2016

Project 6664-04 Lower Passaic River/Newark Bay Modeling

LPR/NB Modeling Program NB Model of the LPR/NB

Task 01 Coordination and Meetings

Coordination and Meetings

**Professional Personnel**

			Hours	Rate	Amount
Senior Engineer/Scientist					
1548	Canizares, Rafael	2/29/2016	2.00	209.00	418.00
1548	Canizares, Rafael	3/1/2016	4.00	209.00	836.00
1548	Canizares, Rafael	3/2/2016	4.00	209.00	836.00
1548	Canizares, Rafael	3/3/2016	4.00	209.00	836.00
1548	Canizares, Rafael	3/4/2016	2.00	209.00	418.00
1548	Canizares, Rafael	3/10/2016	2.00	209.00	418.00
1548	Canizares, Rafael	3/11/2016	1.00	209.00	209.00
1548	Canizares, Rafael	3/16/2016	2.00	209.00	418.00
1548	Canizares, Rafael	3/22/2016	3.00	209.00	627.00
1548	Canizares, Rafael	3/23/2016	1.00	209.00	209.00
Totals			25.00		5,225.00
<b>Total Labor</b>					<b>5,225.00</b>
<b>Total this Task</b>					<b>\$5,225.00</b>

Task 03 System Understanding

System Understanding

**Professional Personnel**

			Hours	Rate	Amount
Engineer/Scientist II					
2219	Mathew, Rooni	2/29/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/1/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/2/2016	8.00	172.00	1,376.00
Staff Engineer/Scientist					
2301	Manian, Dinesh	2/29/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/1/2016	8.00	119.00	952.00
Totals			40.00		6,032.00
<b>Total Labor</b>					<b>6,032.00</b>
<b>Total this Task</b>					<b>\$6,032.00</b>

Task 06 NB HD and ST Model Calibration Report

NB HD and ST Model Calibration Report

**Professional Personnel**

			Hours	Rate	Amount
Senior Engineer/Scientist					
1548	Canizares, Rafael	3/10/2016	2.00	209.00	418.00

1548	Canizares, Rafael	3/11/2016	2.00	209.00	418.00
Engineer/Scientist II					
2219	Mathew, Rooni	3/3/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/4/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/9/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/10/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/11/2016	3.00	172.00	516.00
2219	Mathew, Rooni	3/14/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/15/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/16/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/18/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/21/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/22/2016	7.00	172.00	1,204.00
2219	Mathew, Rooni	3/23/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/24/2016	8.00	172.00	1,376.00
2219	Mathew, Rooni	3/25/2016	8.00	172.00	1,376.00
Staff Engineer/Scientist					
2301	Manian, Dinesh	3/2/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/3/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/4/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/9/2016	6.00	119.00	714.00
2301	Manian, Dinesh	3/10/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/11/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/14/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/15/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/16/2016	7.00	119.00	833.00
2301	Manian, Dinesh	3/17/2016	3.00	119.00	357.00
2301	Manian, Dinesh	3/18/2016	6.00	119.00	714.00
2301	Manian, Dinesh	3/21/2016	8.00	119.00	952.00
2301	Manian, Dinesh	3/22/2016	5.00	119.00	595.00
2301	Manian, Dinesh	3/23/2016	6.00	119.00	714.00
2301	Manian, Dinesh	3/24/2016	7.00	119.00	833.00
2301	Manian, Dinesh	3/25/2016	6.00	119.00	714.00
Totals			220.00		32,158.00
<b>Total Labor</b>					<b>32,158.00</b>
				<b>Total this Task</b>	<b>\$32,158.00</b>
				<b>Total this Phase</b>	<b>\$43,415.00</b>
				<b>Total this Project</b>	<b>\$43,415.00</b>
				<b>Total this Report</b>	<b>\$43,415.00</b>

***Detailed Description of work done by M&N personnel associated to the LPR/NB Modeling Program HD/ST Newark Bay Model - Scope of Work for the period 02/28/2016 to 03/26/2016 M&N Project No. 6664***

**Hydrodynamics Principal Investigator - Rafael Cañizares.**

<b>Task 1 – Project Management</b>	<ul style="list-style-type: none"> <li>• Internal coordination with Deltares and M&amp;N, tasks to be completed</li> <li>• Prepare Final Invoices for several months</li> <li>• Prepare internal budget for completion of Task Order and schedule</li> <li>• Review and evaluate the possibility of postponing the completion of NB tasks</li> <li>• Review and prepare draft invoice. Review internal draft invoice. Review of tasks to complete</li> <li>• Review NB work plan and check that all the work done is in compliance with work plan</li> <li>• Review status of final report</li> </ul>
<b>Task 6 – NB HD and ST Model Calibration Report</b>	<ul style="list-style-type: none"> <li>• Coordinate ST model write up for NB</li> <li>• Coordinate HD calibration write up for NB</li> </ul>

**Rooni Mathew.**

<b>Task 3 – System Understanding</b>	<ul style="list-style-type: none"> <li>• Review Hackensack River TSS temporal trends, review sensitivity results and launch 0607-1213 runs</li> <li>• Review 0607-1213 runs, relaunch additional runs, review CWCM data for discrepancies in location with respect to model</li> <li>• Review medium-term run performance, review HD report outline</li> </ul>
<b>Task 6 – NB HD and ST Model Calibration Report</b>	<ul style="list-style-type: none"> <li>• Review system understanding document and edit/add figures, review medium term runs progress</li> <li>• Develop ST report outline</li> <li>• Develop NB ST report</li> <li>• Review 0607-1213 runs, develop. ST report</li> <li>• Develop. NB ST report, review results from 0607-1213 runs</li> <li>• Process and review 0607-1213 sensitivity runs and finalize</li> </ul>



	<p>NB calibration, develop processing with adjusted CWCM bottom mapping</p> <ul style="list-style-type: none"> <li>• Process and review 0607-1213 sensitivity runs, develop sensitivity runs to navigation scour and clay2 Ws</li> <li>• Develop and launch runs with increased silt2 Ws and decreased clay2 Ws, Review/edit system understanding document</li> <li>• Review/debug runs progress, restart run, review/edit system understanding document</li> <li>• Edit system understanding documents and develop figures</li> <li>• Continue Development of. ST report</li> </ul>
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### Dinesh Manian

<b>Task 3 – System Understanding</b>	<ul style="list-style-type: none"> <li>• Processing Chant's 2008-09 data to estimate annual sediment loads through Kill van Kull;</li> <li>• Processing tidal exchange rates and slack-water timing difference for latest calibration run for comparison with data</li> </ul>
<b>Task 6 – NB HD and ST Model Calibration Report</b>	<ul style="list-style-type: none"> <li>• Hydrodynamic modeling system understanding and data analysis</li> <li>• Hydrodynamic modeling - model calibration in Hackensack and Arthur Kill</li> <li>• Summary of wave modeling in Newark Bay</li> <li>• Hydrodynamic Modeling report: Discussing HD model results</li> <li>• HD modeling report: Processing figures summarizing data, circulation around NB, and tidal exchange</li> <li>• HD modeling report: Processing figures showing model set-up and model-data comparisons for calibrated model</li> <li>• HD modeling Report: Rationale for selection of calibration metrics and calibration parameters</li> <li>• HD modeling report: Additional figures for model calibration</li> <li>• HD modeling report: producing figures for model results</li> <li>• HD modeling report: additional discussion of model results</li> <li>• HD Modeling report: summary of wave modeling</li> <li>• HD modeling report: model results</li> <li>• Preparing figures for System Understanding Report</li> <li>• Preparing figures for System Understanding Report</li> <li>• Additional HD modeling report work</li> </ul>